

M. ERECTION

1. SURVEYS: CONTRACTOR SHALL EMPLOY A REGISTERED PROFESSIONAL ENGINEER OR PROFESSIONAL SURVEYOR EXPERIENCED IN SURVEYING STEEL BUILDING FRAMEWORKS. CONTRACTOR SHALL ORGANIZE STRUCTURAL STEEL SURVEYING PROCEDURES AND REVIEW TO DEMONSTRATE THE DEGREE OF CONFORMANCE OF THE STEELWORK TO TOLERANCES APPLICABLE TO PLUMB, LEVEL, HORIZONTAL ALIGNMENT AND ALLOWABLE DISPLACEMENT FROM THEORETICAL ELEVATION. CONTRACTOR SHALL REPORT ALL DISCREPANCIES. CONTRACTOR SHALL NOT PROCEED WITH EACH ERECTION STEP UNTIL APPROPRIATE ACCEPTABLE CORRECTIONS HAVE BEEN MADE, OR UNTIL COMPENSATING ADJUSTMENTS TO THE STRUCTURAL STEELWORK HAVE BEEN ACCEPTED. CONTRACTOR'S SURVEYS FOR STEELWORK SHALL:

- a) ESTABLISH PERMANENT BENCH MARKS AS SHOWN AND AS NECESSARY FOR THE ACCURATE ERECTION OF STRUCTURAL STEEL.
 - b) . SURE THAT ELEVATIONS OF BEARING SURFACES, AND LOCATIONS OF ANCHOR DEVICES ARE CHECKED BY ACCURATE SURVEYING BEFORE ERECTION WORK PROCEEDS; AND
 - c) PROVIDE SURVEY DATA DURING THE COURSE OF THE WORK AND A FINAL SURVEY SHOWING THE E-W, N-S AND ELEVATION POSITION OF THE WORK POINTS OF EACH STEEL FRAME, COLUMN AND OTHER MAJOR MEMBER AS COMPARED TO THEORETICAL LOCATION.
 - d) TAKE SURVEYS AND MEASURE TOLERANCES AND PLUMBNESS AT 10% (20%) OR SHOW CORRECTIONS TO SURVEYS WHERE TEMPERATURE IS EITHER HIGHER OR LOWER.
2. ANCHOR BOLTS AND OTHER CONNECTIONS: FURNISH ANCHOR BOLTS, EMBEDDED PLATES AND OTHER CONNECTION MATERIALS WHICH MUST BE EMBEDDED INTO CONCRETE WORK. DELIVER TO THE CONSTRUCTION SITE GO-TIME AND COMPLETE WITH TEMPLATE AND PLACING DRAWINGS. TIGHTEN NUTS IN A MANNER OF "TIGHTEN WITH THE INTENT AND THE METALLURGY OF THE BOLT MATERIAL."
 - a) UNLESS OTHERWISE PROVIDED, FOR BOLTS DESIGNATED AS A325, A490 OR DOWEL THREADBARS, TIGHTEN 1/4 TURN PAST SNUG TIGHT.
3. BASE PLATES, AND BEARING PLATES: FURNISH AND PLACE BASE PLATES AND BEARING PLATES ACCURATELY, SECURELY SHIM, LEVEL, AND ALIGN. BE RESPONSIBLE FOR MAINTAINING STEEL IN PROPER POSITION THROUGH COMPLETION OF GROUTING AND UNTIL GROUT HAS ACHIEVED FULL STRENGTH. DO NOT ALLOW GROUTING UNTIL BEAMS, COLUMNS AND SO FORTH ARE PERMANENTLY ATTACHED TO COLUMN.

4. GRUING AND BRACING: THE STRUCTURAL SYSTEM MAY REQUIRE TEMPORARY BRACING IN ADDITION TO MEMBERS SHOWN IN THE CONTRACT DRAWINGS IN ORDER TO RESIST SAFELY ALL POSSED LOADS DURING CONSTRUCTION AND TO MAINTAIN CORRECT ALIGNMENT. PROVIDE TEMPORARY BRACING, BRACING AND CONNECTING MEMBERS NEEDED TO RESIST SAFELY ALL POSSIBLE COMBINATIONS OF CONSTRUCTION AND ERECTION LOADS INCLUDING DEAD LOADS, ERECTION LOADS, WIND AND OTHER LATERAL LOADS AND SUPERIMPOSED CONSTRUCTION LOADS, BOTH HORIZONTAL AND VERTICAL. REMOVE TEMPORARY MEMBERS AND CONNECTIONS AFTER PERMANENT MEMBERS ARE IN PLACE. CONNECTIONS ARE MADE AND CONCRETE HAS ACHIEVED DESIGN STRENGTH.

5. BOLT TENSIONING: ASTM A325 AND A490 BOLTS SHALL BE INSTALLED USING ONE OF THE FOLLOWING SYSTEMS:

- a) TENSION CONTROLLED FASTENERS WITH SPLIT END TWIST-OFF NUTS (TCT) SHALL BE INSTALLED IN ACCORD WITH ALISC SPECIFICATION REQUIREMENTS AND WITH APPLICABLE PRINTED INSTRUCTIONS AND RECOMMENDATIONS PROVIDED BY THE FASTENER MANUFACTURER AND TENSIONING SYSTEM SUPPLIER. TO PROVIDE UNIFORM AND FULL TENSIONING IN MULTI-BOLT JOINTS, BOLTS SHALL BE TIGHTENED IN SEQUENCES TO ASSURE UNIFORM CONTACT BETWEEN FASTENING SURFACES AND SNUG-TIGHT CONDITION AT ALL POINTS WITHIN EACH JOINT PRIOR TO FINAL TENSIONING AND SEPARATION OF THE SPLIT END.
- b) CONTRACTOR SHALL CHECK EACH TCT BOLT AFTER TENSIONING TO VERIFY THAT THE SHOWN SURFACE DOES NOT DISPLAY ANY ABNORMALITY. BOLTS DISPLAYING AN ABNORMALITY SHALL BE REMOVED AND REPLACED.

- b) BOLTS ONE INCH (25 MM) IN DIAMETER AND LARGER AND ALL ASTM A490 BOLTS SHALL BE TENSIONED UTILIZING DIRECT-TENSION INDICATING WASHERS (DTI) IN STRICT ACCORD WITH ASTM F959. UNDER NO CIRCUMSTANCES MAY A DTI BE REUSED. DTI WASHERS SHALL NOT BE USED DIRECTLY OVER SLOTTED OR OVERSIZED HOLES BUT SHALL BE USED IN ADDITION TO ALL SPECIAL WASHERS REQUIRED AT SLOTTED OR OVERSIZED HOLES. TENSIONING METHODS, NUMBER, THICKNESS AND TYPE OF WASHERS, PROCEDURE AND MEASUREMENTS SHALL BE IN STRICT ACCORD WITH THE MANUFACTURER'S LATEST PRINTED INSTRUCTIONS AND RECOMMENDATIONS.

- c) CONTRACTOR SHALL VERIFY CORRECT TENSION BY MEASURING THE AVERAGE AIR GAP BETWEEN THE BOLT HEAD OR NUT AND THE DTI IN STRICT ACCORD WITH ASTM F959. TORQUE WRENCHES OR CALIBRATED WRENCHES SHALL BE USED TO INSPECT OR TO VERIFY THE TENSION.

- d) FOR BOLTS EXPOSED TO THE WEATHER, GAPS IN TYPE 316 STAINLESS STEEL SHALL BE REDUCED TO LESS THAN 0.005 INCHES (0.127 MM) FOR NOT LESS THAN HALF OF THE PERIMETER OF THE DTI. PROVIDE ADDITIONAL GAP REDUCTION WHERE REQUIRED TO PROHIBIT MOISTURE INTRUSION.

- c) FILLER BEAMS MAY, AT CONTRACTOR'S OPTION, BE CONNECTED WITHOUT USE OF A TENSION CONTROL DEVICE BUT, IF SO, SHALL BE TENSIONED BY THE TURN-OF-THE-NUT TECHNIQUE. FILLER BEAMS DO NOT FRAME TO, OR FRAME IMMEDIATELY ADJACENT TO, COLUMNS, DO NOT FRAME TO OTHERS CARRYING LOADS, POSITIVE OR NEGATIVE (EXCEPT STAIR LANDING HANGERS), AND DO NOT FRAME TO TRUSSES.

- d) EXCEPT WHERE SPECIFICALLY WAIVED IN THE STRUCTURAL DRAWINGS, ALL A325 AND A490 BOLTS, WHETHER OR NOT USED IN BEARING-TYPE CONNECTIONS, SHALL BE FULLY TENSIONED. THIS REQUIREMENT SHALL BE MAINTAINED WHETHER OR NOT REQUIRED BY ALISC SPECIFICATION.

6. BOLTING REQUIREMENTS: CONTRACTOR SHALL PAY STRICT ATTENTION TO THE APPLICABLE CODES AND STANDARDS TO THE REQUIREMENTS OF THIS SPECIFICATION AND TO THE FOLLOWING GENERAL REQUIREMENTS:

- a) IMPACT WRENCHES USED FOR TIGHTENING ASTM A325 AND ASTM A490 BOLTS SHALL BE IN SUFFICIENTLY GOOD REPAIR TO DEFENDABLY DELIVER THE MANUFACTURER'S FULL RATED TORQUE. AIR COMPRESSOR(S) USED TO POWER IMPACT WRENCHES SHALL BE IN GOOD REPAIR AND SHALL BE CAPABLE OF DELIVERING ADEQUATE AIR PRESSURE AND VOLUME SO THAT FULL RATED PERFORMANCE IS ACHIEVED FROM EACH WRENCH AT THE POINT OF BOLTING. AIR HOSES AND COUPLINGS SHALL BE NON-LEAKING. THE IMPACT WRENCHES SELECTED SHALL TIGHTEN THE BOLTS TO NOT LESS THAN THE MINIMUM SPECIFIED TENSION IN TEN SECONDS OR LESS.

- b) FOR BOLT SIZES EQUAL TO OR LARGER THAN 1 IN. (25 MM) A325 AND 7/8 IN. (22 MM) A490, PROVIDE IMPACT WRENCHES EQUIVALENT TO OR LARGER IN CAPACITY THAN A CHICAGO PNEUMATIC 6120, WITH AIR PRESSURE AT THE WRENCH NOT LESS THAN 100 PSI (700 KPA).

- b) WASHERS: A HARDENED WASHER SHALL BE INSTALLED ADJACENT TO THE BEARING FACE OF THE TURNED ELOSTUT (NUT OR BOLT HEAD) OF EACH ASTM A315 OR ASTM A490 BOLT ASSEMBLY. A 1/16 INCH (1.6 MM) THICK WASHER OR THICKER, OTHERWISE CONFORMING TO ASTM F416, SHALL BE USED AT BOTH ENDS OF 1-1/8 INCH (32 MM) DIAMETER AND 1-1/4 INCH (32 MM) DIAMETER A490 BOLTS CONNECTING MATERIAL WITH STANDARD SIZE HOLES WHERE MATERIAL IS 5/8 INCH (16 MM) OR LESS IN THICKNESS.

- c) LONG SLOTTED HOLES, WHERE ACCEPTED, AND WHERE ON AN OUTSIDE PLATE, SHALL BE COVERED COMPLETELY BY 5/16 INCH (8 MM) HARDENED WASHERS; ALTERNATIVELY, EITHER PLATE WASHERS OR CONTINUOUS BARS OF AT LEAST 3/8 INCH (10 MM) THICKNESS AND MINIMUM YIELD POINT OF $F_y = 50$ KSI (345 MPa) MAY BE USED. HOLES IN PLATE WASHERS OR BARS SHALL BE STANDARD SIZE. REGULAR HARDENED WASHERS ARE REQUIRED IN ADDITION TO PLATE WASHERS OR BARS.

- d) SHORT SLOTTED AND OVERSIZED HOLES, WHERE ACCEPTED, AND WHERE ON AN OUTSIDE PLATE, SHALL BE COVERED BY HARDENED WASHERS, PLATE WASHERS OR CONTINUOUS BARS AS PROVIDED FOR LONG SLOTTED HOLES.

- e) BOLTS AND NUTS, AT TIME OF TIGHTENING, SHALL BE CLEAN, RUST-FREE, FREE FROM THREAD DAMAGE, AND SHALL RETAIN NOT LESS THAN THE LIGHT RESIDUAL COATING OF OIL AS RECEIVED FROM THE FACTORY. THREAD LUBRICANTS SHALL BE APPLIED TO ALL ASTM A490 BOLTS OR NUTS, TO ALL IN. 125 MM AND LARGER ASTM A315 BOLTS AND TO ALL BOLTS AND NUTS THAT DISPLAY ANY SIGN OF LOSS OF RESIDUAL OIL, RUST OR OTHER CONTAMINANT. WHERE GALVANIZED NUTS ARE NOT MAN-DIPPED BY MANUFACTURER, APPLY THREAD LUBRICANT.

- f) LUBRICATION SHALL BE COMPLETED PRIOR TO ASSEMBLY AND PRIOR TO BOLTS BEING SENT INTO THE STEEL FRAME.

- g) IN THE EVENT OF A DISPUTE REGARDING TIGHTNESS OF BOLTS INSTALLED IN THE FIELD, CLEANNELINESS AND LUBRICATION OF BOLTS AND NUTS USED FOR VERIFICATION TESTS SHALL BE SPECIFICALLY REPRESENTATIVE OF FIELD MATERIALS AND CONDITIONS.

- h) TIGHTENING PROCEDURES: DURING TIGHTENING, TO THE FULL EXTENT PRACTICAL, THE TURNED BOLT ELEMENT SHALL BE HELD WITHOUT ROTATION. ALL PLIES SHALL FIRST BE BROUGHT INTO FULL CONTACT BY PARTIALLY TENSIONING ALL OF THE BOLTS. TENSIONING SHALL COMMENCE FROM THE MOST RIGID PART OF THE CONNECTION, MOVING TO THE FREE EDGES.

- i) RETIGHTENING: ASTM A490 BOLTS AND GALVANIZED ASTM A315 AND A490 BOLTS, DONE COMPLETELY OR PARTIALLY TORQUED, SHALL NOT BE REUSED. ASTM A325 BOLTS MAY BE REUSED ONLY WITH SPECIFIC WRITTEN ACCEPTANCE.

- j) LENGTH: BOLTS SHALL NOT PROJECT BEYOND THE FACE OF THE NUT BY MORE THAN 0.25 INCHES (6 MM). SMALLER LENGTHS MAY BE REQUIRED TO ACHIEVE CLEARANCE.

7. UNFAIR HOLES SHALL NOT BE ENLARGED BY BURNING OR DRIFTING ALONE. ENLARGE HOLES WHERE NECESSARY AND PERMITTED BY FLAME PIERCING AND REPAIRING OR BY READING ALONE OR BY OTHER ACCEPTED MEANS. HOLES AFTER ENLARGEMENT SHALL BE TRUE ROUND HOLES NORMAL TO THE SURFACES JOINED. INCREASE BOLT SIZE TO FILL ENLARGED AND REPAIR HOLES.

8. SPLICES: COLUMN SPLICES AND OTHER COMPRESSION JOINTS THAT DEFEND FROM CONTACT BEARING AFTER ALIGNMENT SHALL CONFORM WITH THE FOLLOWING:

- a) BEARING SURFACES SHALL BE CLEANED BEFORE THE PARTS ARE ASSEMBLED.

- b) FASTENING OF COMPRESSION SPLICES AND JOINTS SHALL BE PERFORMED AFTER THE ADJUTING SURFACES HAVE BEEN BROUGHT UNIFORMLY INTO CONTACT.

- c) AN AREA OF NOT LESS THAN 65% OF THE CONTACT AREA SHALL BE IN UNIFORM BEARING, WHERE:

- 1) CONTACT AREA IS THE GROSS AREA OF THE SMALLER PIERCE JOINED, WITHOUT DEDUCT FOR BOLT BEVELS AND THE LITE.

- 2) AREA OF UNIFORM BEARING IS THAT PORTION OF THE CONTACT AREA WHICH IS SEPARATED BY NOT MORE THAN 0.02 INCHES (500 MM) FROM THE LARGER PIERCE JOINED. NOTE THAT THE TOTAL AREA OF SURFACE JOINED BY WELDING IS INCLUDED. AT CONTRACTOR'S OPTION, THE AREA OF UNIFORM BEARING MAY BE INCREASED TO CORRECT FIT-UP DEFICIENCIES BY EITHER:

- A. INCREASING THE WELD SURFACE AREA; OR
- B. PACKING WITH STAINLESS STEEL SHIMS, 0.02 INCHES (500 MM) OR THINNER IN THICKNESS.

- d) THE AREA OF UNIFORM BEARING SHALL BE LOCATED SYMMETRICALLY ABOUT BOTH OF THE SYMMETRICAL AXES OF THE SMALLER PIERCE JOINED. TO ACHIEVE THIS REQUIREMENT, ANY PART OF THE AREA OF UNIFORM BEARING MAY BE NEGLECTED, PROVIDED THAT THE REMAINING AREA IS NOT LESS THAN 55% OF THE CONTACT AREA.

- e) OUTSIDE OF THE AREA OF UNIFORM BEARING, SEPARATIONS GREATER THAN 0.03 INCHES (750 MM) SHALL BE CORRECTED BY SHIMMING.

9. FINGER TIGHT: BOLTS DESIGNATED AS "FINGER TIGHT" SHALL BE TENSIONED TO 50 INCH-POUNDS (6 N-M) WITH THE GOALS OF BRINGING THE PARTS FIRMLY TOGETHER WHILE ALLOWING FOR A SLIDING CONNECTION. PROVIDE DOUBLE NUTS AT ALL SUCH LOCATIONS. PROVIDE NOT LESS THAN TWO FULL CYCLES OF TORQUING AND UNTORQUING TO ENSURE THAT ALL BOLTS ARE PROPERLY TENSIONED.

10. SHIMS, WHERE REQUIRED TO CORRECT FIT-UP OF WORK, SHALL BE OF STAINLESS STEEL.
11. RUNOFF AND RUNN TAPS SHALL BE PROVIDED AT THE ENDS OF ALL SENSITIVE BUTT WELDS AND BOTH TABS AND ERECTION AIDS SHALL BE REMOVED AT ALL LOCATIONS WHERE THEY INTERFERE WITH THE WORK OF OTHER TRADES, AND AT ALL LOCATIONS DESIGNATED. RUNOFF TABS SHALL BE NOT LESS THAN 1-1/4 INCHES (32 MM) IN LENGTH.

12. DRILLED-IN ANCHORS SHALL BE INSTALLED IN STRICT ACCORD WITH MANUFACTURER'S PRINTED INSTRUCTION. SET PERPENDICULAR TO CONCRETE SURFACE. ANCHORS MAY BE PLACED IN BLOCK OR BRICK WORK ONLY WHERE VOIDS WITHIN 9 INCHES (230 MM) OF THE ANCHOR HAVE BEEN FILLED SOLIDLY, WITH GROUT. DRILLED HOLES SHALL BE CLEANED THOROUGHLY BY COMPRESSION AIR OR WATER JET. IN STRUCTURAL STEEL, INTENDED TO FIT OVER DRILLED-IN ANCHORS, SHALL BE 1/16 INCH (1.59 MM) LARGER THAN THE NOMINAL DIAMETER OF THE BOLT EXCEPT WHERE LARGER OR SMALLER HOLES ARE STIPULATED IN THE CONTRACT DRAWINGS. PROVIDE STAINLESS PLATE WASHER.

13. LOCK NUTS, DOUBLE NUTS OR THREAD LOCKING COMPOUND SHALL BE USED ON ALL NUTS NOT TENSIONED IN ACCORD WITH THE SPECIFICATIONS FOR A315 OR A490 BOLTS AND ON ALL A307 BOLTS. PROVIDE THREAD LOCKING COMPOUND ON A325 AND A490 BOLTS ONLY WHERE ALLOWED SPECIFICALLY IN THE CONTRACT DRAWINGS; AT OTHER LOCATIONS, USE DOUBLE NUTS OR LOCKING NUTS AS SPECIFIED HEREIN.

N. CLEANING, PAINTING AND GALVANIZING

1. GENERAL: STEEL WORK SHALL BE CLEANED, PAINTED OR GALVANIZED AS PROVIDED HEREIN. BASIC WORK SHALL BE DONE IN THE SHOP, WITH FIELD TOUCH-UP, ONLY, DONE IN THE FIELD.

2. CORROSION PROTECTION: THIS SPECIFICATION CONTEMPLATES 6 LEVELS OF CORROSION PROTECTION:

- a) FIREPROOFED/UNPAINTED: STEEL WORK SHALL BE SHOP CLEANED TO MEET THE REQUIREMENTS OF SSPC-SP3. ADDITIONAL CLEANING SHALL BE ACCOMPLISHED IN THE FIELD TO ALLOW PROPER ADHERENCE OF SPRAY FIREPROOFING.

- b) FIREPROOFED/SHOP PRIMER: PROVIDE AS FOR FIREPROOFED/UNPAINTED, BUT PAINT WITH SHOP PRIMER WITH FIELD TOUCH-UP, NOT LESS THAN 2.0 NOR MORE THAN 4.0 DRY FILM THICKNESS (50 MM/100 MM). PROVIDE ONLY WHERE SHOWN SPECIFICALLY IN THE CONTRACT DRAWINGS.

- c) SHOP PRIMER: PROVIDE AS FOR FIREPROOFED/SHOP PRIMER.

- d) EXPOSED TO AMBIENT TEMPERATURE: STEEL WHICH IS ENCLOSED, CONCRETE-ENCASED OR FIREPROOFED, BUT WHICH IS NOT PROTECTED FROM CHANGES IN AMBIENT TEMPERATURE, SHALL BE CLEANED TO MEET THE REQUIREMENTS OF SSPC-SP3 BEFORE PAINTING WITH A ZINC-RICH PRIMER WITH FIELD TOUCH-UP, NOT LESS THAN 2.0 NOR MORE THAN 3.5 DRY FILM THICKNESS (50 MM/90 MM).

- 1) PROVIDE GALVANIZED BOLTS, NUTS, WASHERS, DTI'S AND INSERTS, AS APPLICABLE, FOR THE BOLTING OF MEMBERS EXPOSED TO AMBIENT TEMPERATURES.

- 2) MEMBERS EXPOSED TO AMBIENT TEMPERATURES SHALL BE FULLY PAINTED. NO-PAINT AREAS ARE NOT PERMITTED.

- e) EXPOSED TO WEATHER: STEEL WHICH IS EXPOSED TO THE WEATHER INCLUDING EXTERIOR LINTELS (EXCEPT WHERE STAINLESS IS REQUIRED) SHALL BE HOT-DIPPED GALVANIZED. TOUCH-UP AT WELDS AND AT DAMAGED SURFACES AFTER FIRST CLEANING TO SSPC-SP3, WITH SLAG AND WELD SPATTER REMOVED FROM ALL AREAS. PAINT GALVANIZED STEEL WHERE SHOWN IN THE CONTRACT DRAWINGS.

- 1) PROVIDE GALVANIZED BOLTS, NUTS, WASHERS, DTI'S, AND INSERTS, AS APPLICABLE, FOR THE BOLTING OF GALVANIZED MEMBERS.

3. PAINT SHALL BE APPLIED ONLY TO DRY SURFACES, ONLY AT TIMES WHEN STEEL SURFACE TEMPERATURES ARE ABOVE THE DCP POINT, AND SHALL BE APPLIED THOROUGHLY AND EVENLY WITHOUT SAGS OR HOLIDAYS. PAINT SHALL BE APPLIED BY SUITABLE SPRAY EQUIPMENT IN STRICT ACCORD WITH THE PAINT MANUFACTURER'S PRINTED INSTRUCTIONS. PROVIDE A DRY FILM THICKNESS WITHIN THE RANGE SPECIFIED HEREIN, INCLUDING AROUND OUTSIDE CORNERS OR OTHER ABUNT CHANGES IN SURFACE PROFILE.

4. FIELD TOUCH-UP SHALL BE PROVIDED TO FIELD BOLTS OF PAINTED AND OF GALVANIZED CONNECTIONS AND TO ALL POINTS OF DAMAGE, INCLUDING AREAS RECEIVING WELD AFTER COATING.

- a) UNPAINTED SURFACES SHALL BE RECLEANED TO THE EXTENT NECESSARY TO ACHIEVE SOUND TIGHT BOND OF OTHER WORK.

- b) PAINTED SURFACES SHALL BE CLEANED AND PAINTED TO THE STANDARDS OF THE SHOP COATING AND TOUCH-UP SO AS TO AVOID FOR WORKMANLIKE SURFACES AND FOR TIGHT BOND OF OTHER WORK.

- c) GALVANIZED SURFACES SHALL BE CLEANED OF SLAG AND BURNED METAL BY VIGOROUS WIRE BRUSHING AND OTHER TOOLS, TO PRODUCE SHINY METAL, FREE FROM LOOSE PARTICLES. FINISH CLEAN BY SOLVENTS IN ACCORD WITH SSPC-SP1. FIELD-REPAIR GALVANIZING TOUCH-UP TO ACHIEVE QUALITY OF THE ORIGINAL AND UNPAINTED SHOP COATING.

- d) COAT NO-PAINT AREAS AFTER COMPLETION OF ERECTION.
5. CONTACT WITH ALUMINUM: SURFACES WHICH WILL BE IN CONTACT WITH ALUMINUM SHALL RECEIVE TWO COATS OF ALUMINUM PASTE VARNISH OVER A SHOP-PRIMED SURFACE.

IV. REINFORCED CONCRETE

- A. SEE ARCHITECTURAL DRAWINGS FOR EXACT DETAIL AND LOCATION OF CURBS, OPENINGS OR RECESSES IN SLABS AND FOR OTHER DIMENSIONS NOT SHOWN IN STRUCTURAL DRAWINGS.

- B. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR INFORMATION REGARDING SIZE AND LOCATION OF OPENINGS FOR DUCTS, PIPES, CONDUITS AND THE LIKE, FOR MACHINE PADS, ETC.

- C. OPENINGS OR RECESSES IN THE STRUCTURE WHICH ARE NOT SHOWN IN THE STRUCTURAL DRAWINGS, EITHER DIRECTLY OR BY TYPICAL DETAIL, SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW.
- B. NORMAL WEIGHT CONCRETE MIXTURES SHALL BE READY-MIXED CONCRETE 28-DAY COMPRESSIVE STRENGTH $F'_c = 4,000$ PSI AND WITH A DRY UNIT WEIGHT OF 145 PCF UNLESS OTHERWISE NOTED. LIGHTWEIGHT CONCRETE MIXTURES SHALL BE READY-MIXED CONCRETE 28-DAY COMPRESSIVE STRENGTH $F'_c = 4,000$ PSI. READY-MIXED CONCRETE SHALL BE SUPPLIED BY A NEW YORK CITY CERTIFIED BATCH PLANT.

- 2) LIGHTWEIGHT CONCRETE SHALL PROVIDE AN AIR-DRY UNIT WEIGHT OF NOT LESS THAN 110 PCF (1760 KG/CUBIC METER) NOR MORE THAN 115 PCF (1840 KG/CUBIC METER), MEASURED IN ACCORD WITH ASTM C567, AND SHALL HAVE A MAXIMUM FRESH UNIT WEIGHT OF 120 PCF (1870 KG/CUBIC METER). ALL MEASUREMENTS SHALL BE TAKEN AT POINTS OF DISCHARGE INTO THE WORK.

- 3) LIGHTWEIGHT COARSE AGGREGATE SHALL BE A NOTARY KILN PRODUCT OF EXPANDED SHALE OR SLATE, CONFORMING TO ASTM GRADE #8 (9.5 TO 2.4 MM).

- 4) HAND-MIXED CONCRETE SHALL BE USED ONLY WHERE SPECIFICALLY ACCEPTED BY ENGINEER. SUCH CONCRETE SHALL BE MIXED ONLY IN VOLUME, SAND AND CEMENT MIXED TOGETHER PRIOR TO ADDING COARSE AGGREGATE. WATER, WHEN ADDED, SHALL BE APPLIED SLOWLY WITH THE ENTIRE MASS TURNED TO PROVIDE FOR AN EVEN MIXTURE AT ALL TIMES.

- C. UNLESS OTHERWISE NOTED, ALL WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185. ALL REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM A615, GRADE 60.

- D. MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCEMENT (SUBJECT TO TO EXEMPTIONS PERMITTED BY CODE) IN ACCORDANCE WITH ACI 318, UNLESS OTHERWISE INDICATED.

- E. SPLICING OF WY, AT ALL SPACED ENDS SHALL BE SUCH THAT THE OVERLAP MEASURED BETWEEN OUTERMOST CROSS WIRES OF EACH FABRIC SHEET IS NOT LESS THAN THE SPACING OF THE CROSS WIRE PLUS 2 INCHES, NOR LESS THAN 8 INCHES.

- F. CAST NEW CONCRETE AS REQUIRED TO REPAIR CONCRETE SLABS, BEAM EXCAVATIONS, AND THE LIKE THAT HAD BEEN DAMAGED OR REMOVED IN THE EXECUTION OF THIS CONTRACT.

1. FILL WITH NON-SHRINK GROUT ALL ABANDONED SLAB OPENINGS.

2. REINFORCING STEEL DESIGNATED TO REMAIN FOLLOWING THE DEMOLITION AND CONCRETE REMOVAL OPERATIONS SHALL BE REPAIRED IF DAMAGED IN THE COURSE OF THE WORK. SUBMIT REPAIR PROCEDURES FOR ACCEPTANCE BY THE ENGINEER.

- H. SPLICING OF REINFORCEMENT IS PERMITTED ONLY AT LOCATIONS SHOWN IN THE CONTRACT DRAWINGS OR AS ACCEPTED BY THE ENGINEER. UNLESS OTHERWISE SHOWN OR NOTED, REINFORCING STEEL SHALL BE SPLICED FOR ITS FULL TENSILE CAPACITY IN ACCORDANCE WITH ACI 318.

- I. REINFORCING BAR DEVELOPMENT LENGTHS SHALL BE COMPUTED IN ACCORDANCE WITH ACI 318-89.

- J. GROUT UNDER BASE PLATES AND BEDDING PLATES SHALL BE NON-SHRINKING TYPE.

- K. HORIZONTAL CONDUITS ARE PERMITTED IN SLABS PROVIDED THAT THE SLAB THICKNESS IS AT LEAST 4" THICK, THE CONDUIT SIZE IS NOT GREATER THAN 1/3 OF THE SLAB THICKNESS (OR 1/6 OF THE SLAB THICKNESS WHERE TWO CONDUITS MUST CROSS), AND THE CONDUIT IS RUN AT MID DEPTH IN THE SLAB THICKNESS AND ARE SPACED NOT LESS THAN THREE CONDUIT DIAMETERS OR NOTED. REINFORCING STEEL PROVIDED IN THE CONTRACT DOCUMENTS. ALUMINUM CONDUIT IS PROHIBITED. CONFORM TO THE REQUIREMENTS OF ACI 318.

V. METAL DECK

- A. METAL FLOOR DECK ACTS AS GALVANIZED STEEL FLOOR 50 GRADE 40, HAVING 1/8" GALVANIZING SHALL COMPLY. FOR INSTALLATION OF WATERPROOF DECKS AND HEAVIER, PROVIDE UNIFORM FLOOR DECK AND 1/2" DEEP TYPE #19.
- B. SHEET METAL ACCESSORIES SHALL BE GALVANIZED.
- C. WELDING MATERIALS SHALL BE AS A5.1 OR A5.5, AND TO STRUCTURAL STEEL AS A5.18 FOR JOINTING STEEL.
- D. SELF-DRILLING FASTENERS SHALL BE 12 INCHES (300 MM) MAXIMUM SPACING, ELK GROVE ENGINEER.
- E. INSTALL STEEL DECK UNLESS MANUFACTURER'S RECOMMENDATIONS ARE SPECIFIED HEREIN.

- F. CLEANING: PRIOR TO LAYING OF DECK, CLEAN SURFACE OF OIL, DIRT AND OTHER INTERFERING WITH THE CURED SHEAR CONNECTIONS OF DECK UNITS TO SUPPORT.

- G. FASTENING: PERMANENT MEMBER BY 0.75 INCH (19 MM) MORE THAN 3 INCHES (76 MM) IS GIVEN IN THE CONTRACT. THE PROVISIONS OF WHICH IN RIBS IN WHICH SHEAR IS GIVEN IN THE CONTRACT. THAT EACH DECK SECTION ADEQUATELY SECURE THE CONTACT WITH THE SUPPORT.
- H. SIDE LAPS: LOCK SIDE LAPS SHALL BE 12 INCHES (300 MM) EXCEEDING 36 INCHES (914 MM) EXCEEDING 12-14 X 3/4" EXCEEDING 18 INCHES (457 MM) REQUIRED TO PREVENT DRY UNDER FRESH CONCRETE.

VI. CONTROLLED INSPECTION

- A. CONTROLLED INSPECTION FOR ALL STRUCTURAL STEEL INSTALLATION OF CONCRETE PLACEMENT OPERATIONS.